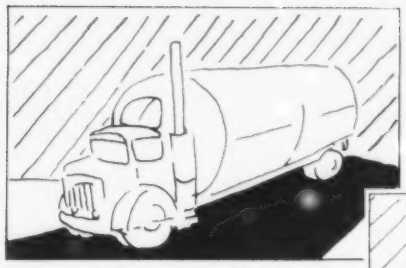
Marketing Services



Technical Services

Laboratory Services

Waste Reduction Program

OWMC

Ontario Waste Management Corporation

Société Ontarienne De Gestion Des Déchets

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OWMC SERVICES AND PROGRAMS

OWMC is committed to assisting generators of hazardous or liquid industrial waste in Ontario to manage their wastes properly. To achieve this goal, OWMC's waste management engineers and chemists offer three services/programs to generators of waste in Ontario, namely:

- Waste Reduction Program
- Technical Services Program
- Laboratory Services.

Our staff apply their varied practical expertise to offer waste generators an integrated approach to solving site-specific waste management problems. We are available to assist you either over the telephone or by visiting your plant site.

When working with waste generators, OWMC applies the hierarchy of waste management that is generally accepted in North America:

- Reduce
- Reuse
- Recycle (or Exchange)
- Recover
- On-site Waste Treatment
- Off-site Waste Treatment and Disposal

The application of this hierarchy will ensure that waste management costs are minimized by reducing either the quantity of waste generated or the hazardous nature of the waste, at every step.

In this brochure, the programs/services named above are described in detail.

WASTE REDUCTION PROGRAM

Ontario Waste Management Corporation

Société Ontarienne De Gestion Des Déchets

WASTE REDUCTION PROGRAM

OWMC's Waste Reduction Program advocates the application of the hierarchy of waste management. According to this strategy, waste minimization via the 4Rs is the most desirable and cost-effective approach.

Reduction: Reducing either the quantity or hazard-level of wastes generated;

Reuse: Reusing waste streams in-house without prior treatment;

Recycling/Exchange: Recycling waste streams to another production process; may involve pretreatment to ensure appropriate composition;

Recovery: Recovering component(s) of value from wastes prior to final treatment and disposal.

The following pages offer information on the services which OWMC's Waste Management Specialists provide to Ontario industry. The programs described represent the on-going commitment to the 4Rs, and practical knowledge that is available to businesses tackling their waste management problems.

TECHNICAL CONSULTATION

The need for waste management assistance has never been greater. Faced with increased waste disposal costs, and more stringent environmental regulations, companies are searching for ways to minimize their wastes and associated waste management costs.

Small and medium-sized companies may feel more pressured as staffing and economic constraints put them at a disadvantage.

OWMC's Waste Management Specialists are available, free of charge, to offer confidential assistance to those companies searching for practical and cost-effective ways to reduce, reuse, recycle, and recover their wastes.

OWMC's Waste Management Specialists will:

- Answer your questions by phone;
- Meet at your plant to discuss your waste management problems and needs;
- Review your plant processes and overall operations and advice you how to reduce the volume or hazard associated with your wastes. This might encompass a comprehensive waste audit;
- Supply you with the appropriate contacts in the waste management field to ensure your site-specific problems are solved.

See also: WASTE AUDITS
TECHNICAL SERVICE

For more information contact: Ken Bradley, Waste Reduction Program, OWMC, 2 Bloor Street West, Toronto, Ontario M4W 3E2 (416) 923-2918, 1-800-268-1178, Fax 923-7521.

WASTE AUDITS

A successful waste reduction program starts with increased awareness of how hazardous wastes are generated. This can be satisfied by conducting a waste audit.

A waste audit is an analysis of a company's plant processes to determine what wastes are being generated, what they consist of, where they come from, where they are going and how much there is. Once this is determined you will have a clear understanding of the potential that exists for the application of the 4Rs through production/process modifications, material substitutions, etc.

In the process of the audit, it is necessary to measure volumes and concentrations of the various input and output streams to complete material balances around the unit processes. To this end, sampling and analysis, and proper flow measurement play an integral part in the process.

OWMC's Waste Management Specialists, in conjunction with our laboratory chemists, will assist with a company's on-site waste audit. If a company needs more insight into the waste audit process before embarking on one, we recommend our Waste Reduction Opportunities Workshop. In addition, our Industrial Waste Audit and Reduction Manual (W.A.R.M.) is available as a self-help guide in conducting a waste audit. The "WARM" takes you through each step of the audit process, from appointing an audit team to analyzing the costs and benefits of 4Rs techniques. The auditing process is illustrated using case studies based on actual situations.

See also: WORKSHOPS

For more information contact: John Richmond, Waste Reduction Program, OWMC, 2 Bloor Street West, Toronto, Ontario M4W 3E2 (416) 923-2918, 1-800-268-1178, Fax 923-7521.

WORKSHOPS

It is not uncommon for companies today to form committees with representation from various departments to coordinate their waste management projects at the plant level. Smaller organizations are more apt to put one person in charge of waste management issues, often as an added responsibility.

Be it a large working group or one person's responsibility, they may feel that they require guidance and training to tackle waste management problems.

In order to assist industry in implementing successful waste management programs, OWMC offers workshops/seminars across Ontario.

Participants will learn to:

- Audit processes and wastes to gain a clear understanding of waste problems
- Improve effluent monitoring and sampling
- Identify and assess opportunities for reducing wastes including exchange
- Build management and employee support and commitment to waste reduction
- Identify waste management alternatives
- Weigh the costs and benefits of alternatives
- Implement simple and inexpensive measures to immediately reduce waste.

The workshops can be designed for the specific needs of:

. individual companies (performed in-house)
. trade associations
. individual industry sectors
. industrial groups.

They can be tailored to suit all levels of staff, from plant personnel to upper management.

For more information contact: Jody E. Sabo, Waste Reduction Program, OWMC, 2 Bloor Street West, Toronto, Ontario M4W 3E2 (416) 923-2918, 1-800-268-1178, Fax 923-7521.

INFORMATION SERVICE/TECHNICAL LIBRARY

A company's in-house library is frequently the first place of reference when a technical problem arises. However, depending on the size of the firm, businesses may not have the resources or staff to support an extensive information centre containing up-to-date literature.

The need for current, technical information in the field of waste management is increasing as companies examine how they can cut costs and save money by implementing waste reduction projects.

In addition to the knowledge and experience of OWMC's Waste Management Specialists, **you can tap into the world's collection of recorded information on waste reduction and waste management.** We can provide you with information from our own library, or conduct a computerized information search on your particular waste problem. A waste management specialist can take your request over the phone or we may be able to bring our equipment to your site, perform an information search, and give you the results immediately. The information service/technical library aims to satisfy your waste management information needs quickly, conveniently and effectively.

See also: MINI RESEARCH PROJECTS

For more information contact: Rob Michalowicz, Waste Reduction Program, OWMC, 2 Bloor Street West, Toronto, Ontario M4W 3E2 (416) 923-2918, 1-800-268-1178, Fax 923-7521.

MINI RESEARCH PROJECTS

Often a company experiences a waste management problem which appears common to a number of other companies or even industries.

To evaluate the possible applications of existing and new technologies in the area of waste minimization, OWMC funds small-scale research projects. Our goal is to find simple and economic ways to reduce, reuse, recycle, and recover industrial waste, thereby diverting the waste from disposal.

Several project titles follow:

- Demonstration of a novel reactor design for continuous flow hydrolysis of concentrated cyanide wastes
- The ammoniation of calcium phosphates for fertilizer production - a literature review
- Phenol adsorption by silicalite
- Possible uses for oil soap - a literature review
- Up-grading of "spent" sulphuric acid used for drying hydrocarbons
- Assessment of complex cyanide destruction techniques
- Removal of phosphorous contaminants from electroless nickel plating baths
- Metal leaching of paint sludge

For more information contact: Les Kuczynski, Waste Reduction Program, OWMC, 2 Bloor Street West, Toronto, Ontario M4W 3E2 (416) 923-2918, 1-800-268-1178, Fax 923-7521.

NORTHERN ONTARIO SPECIAL ASSISTANCE PROGRAM

Because of the special needs of industry in Northern Ontario, i.e. physical distance from southern Ontario markets for waste management, OWMC has established a special technical assistance program.

OWMC's Waste Management Specialists provide technical assistance, free of charge, to selected industrial firms. They will recommend cost effective waste reduction methods through the following:

- In-plant waste reduction workshops
- Plant visits and consultations
- Discounted or free services for chemical analysis of wastes
- Literature searches
- Mini-research projects
- Assistance with waste audits in selected plants

See also: TECHNICAL CONSULTATION

For more information contact: Les Kuczynski, Waste Reduction Program, OWMC, 2 Bloor Street West, Toronto, Ontario M4W 3E2 (416) 923-2918, 1-800-268-1178, Fax 923-7521.

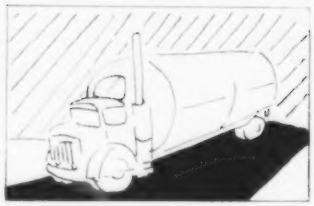
AWARDS PROGRAM

OWMC's Waste Management Specialists are continually making companies aware of the potential that exists for the implementation of the 4Rs. Also, our specialists are made aware of how companies in various industries have successfully trimmed their wastes through reduction, reuse, recycling, and recovery. As a means of sharing this information, OWMC produces a quarterly publication; the Waste Reduction Bulletin. This bulletin, mailed to over 12,000 plant managers and owners, engineers and environmental consultants in Ontario and across Canada, discusses the successes companies have experienced through the implementation of efficient and cost-effective waste minimization projects.

Another vehicle to share this practical information is through OWMC's Outstanding Waste Reduction Performance Award. This award recognizes and honours those organizations who have found innovative ways to reduce the generation of liquid industrial and hazardous wastes. By bringing these success stories to the attention of other businesses in the same industry and other industry sectors, they are made aware of the potential that exists for the 4Rs, and possibly can apply the technology, or technique, to their own operations.

Any organization in Ontario which has successfully minimized the volume or hazard associated with their registered wastes is invited to apply. The annual award will by judged by a panel with representation from industry, government, environmental and academic communities.

For more information contact: Jody E. Sabo, Waste Reduction Program, OWMC, 2 Bloor Street West, Toronto, Ontario M4W 3E2 (416) 923-2918, 1-800-268-1178, Fax 923-7521.

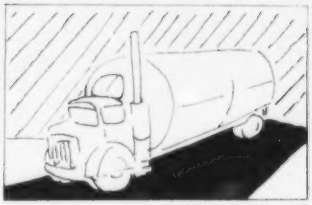


TECHNICAL SERVICES PROGRAM

OWMC

Ontario Waste
Management Corporation

Societe Ontarienne
De Gestion Des Dechets



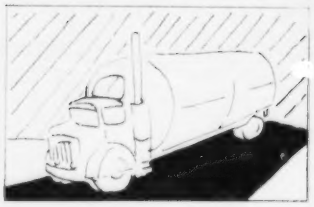
TECHNICAL SERVICES PROGRAM

Once waste generation has been minimized, there often remains waste for which no further application of the 4Rs is feasible. At this point, decisions must be made concerning the costs and benefits of available on-site and off-site waste treatment and disposal options.

OWMC's Technical Services Program assists waste generators by providing information on appropriate treatment technologies, including process efficiencies, and estimated capital and operating costs. Our waste management specialists will visit your plant site and assist you in determining the best waste management option for your specific wastes.

In addition, the program offers advice on other areas of waste management, including spill clean-up, site decommissioning and reclamation, PCB waste management, and safety prcedures for handling hazardous and liquid industrial waste.

The following pages provide general information on the above and describe in more detail the services which OWMC offers to Ontario waste generators through the Technical Services Program.



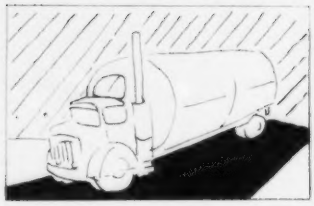
ON-SITE WASTE TREATMENT

General Information

On-site waste treatment refers to end-of-pipe treatment which is implemented at the site of generation and includes the use of mobile technologies. A wide variety of treatment technologies are appropriate for in-plant or mobile applications. Determination of the best available, cost-effective technology for any waste can be a difficult process. There are many factors which play a role in determining the attractiveness of any technology to a particular application, including:

- Process efficiency
- Compliance with government regulations
- Optimal use of existing equipment and process streams
- Capital cost and pay-back period
- Operating cost
- Proven technology versus developmental
- Consistency with firm's business, public image, personnel skills
- Residues produced - type, quantity and ease/cost of disposal

Each of the above factors should be carefully investigated for all technologies under consideration.



ON-SITE WASTE TREATMENT (Cont'd)

OWMC Services

The OWMC Technical Services Program offers a wide range of information and assistance related to on-site waste treatment technologies and their application.

Since most production processes have site-specific waste management constraints, OWMC's Waste Management Specialists will visit your site to recommend waste management options which are suitable to your particular needs.

To assist waste generators with the proper on-site management of wastes, the Technical Services Program offers advice and guidance in the following areas:

- Identification of on-site treatment technologies which are applicable to your waste type

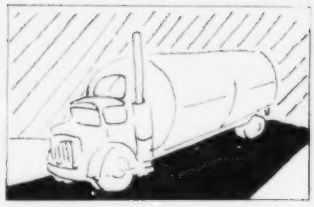
- Comparison of the identified technologies to determine those which are best suited to your site-specific needs and requirements

- Availability - OWMC's staff can provide you with the names of engineering companies which offer these technologies to Ontario's waste generators

- During the implementation stage, OWMC can assist you during the start-up phase via fast and accurate analysis of process and treatment effluent samples

See Also : LABORATORY SERVICES
OFF-SITE WASTE TREATMENT AND DISPOSAL

For more information contact: Janet L. Laird, Technical Services Program, OWMC, 2 Bloor Street West, Toronto, Ontario, M4W 3E2, (416) 923-2918, 1-800-268-1178, Fax 923-7521.



OFF-SITE WASTE TREATMENT AND DISPOSAL

General information

Off-site waste treatment and disposal refers to final treatment of the waste by an off-site waste management company, and disposal of the resulting treatment residues. There are a wide range of treatment technologies which are available off-site through waste management companies. When seeking a suitable off-site destination for your wastes, there are a number of issues to be considered, including:

- The treatment process must comply with or exceed all applicable government regulations

- The cost of complete service, including: waste collection, transportation, transfer, treatment, and disposal of the treatment residues

- Availability of suitable equipment for collection and transportation of the waste

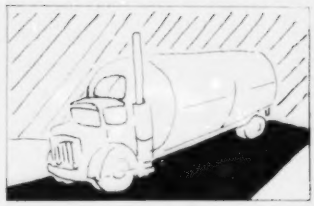
- Reliability and competency of the waste management company

- Frequency of waste collection with respect to available on-site storage capacity

- Availability of associated services through the waste management company, e.g.

    - laboratory services,
    - information on safety procedures for handling hazardous wastes,
    - waste reduction services,
    - information concerning on-site waste treatment technologies,
    - information and advice on government regulations.

Determination of the best available off-site treatment and disposal option for any particular waste can be difficult. It is important to consider all costs and associated benefits.



OFF-SITE WASTE TREATMENT AND DISPOSAL (Cont'd)

OWMC Services

OWMC's Waste Management Specialists will visit your plant site and assist in the selection of the most appropriate treatment and disposal option for any waste stream.

If off-site treatment is the most appropriate strategy, there are many factors that must be considered in the selection of the optimal off-site management process for your waste. OWMC offers advice and information on the following issues:

- Economical and accurate analysis of your wastes to define your particular waste management needs

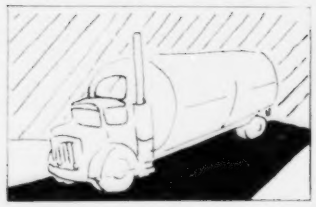
- Identification of all commercially-available technologies which are applicable to your waste type

- Comparison of the available off-site treatment processes in terms of typical cost, ability to treat your waste in compliance with government regulations, and service reliability

- Recommendations of the best available off-site treatment and disposal options for your waste

See Also : ON-SITE WASTE TREATMENT

For more information contact: Janet L. Laird, Technical Services Program, OWMC, 2 Bloor Street West, Toronto, Ontario, M4W 3E2, (416) 923-2918, 1-800-268-1178, Fax 923-7521.

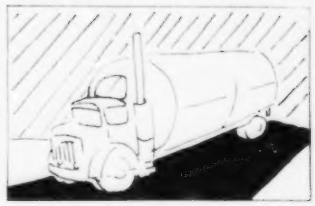


SITE DECOMMISSIONING AND RECLAMATION

General information

When a site requires decommissioning or reclamation, or when a chemical spill occurs, a variety of planned steps and specific skills may be required. Depending on the complexity of the problem any or all of the following steps may be required.

- Notify appropriate government offices; provide the MOE with initial documentation (e.g. site plan to scale, program time frame)
- Public consultation program
- Preliminary site assessment; identify potential contaminants and likely locations of concern
- Protocol development, e.g. for sampling, analytical QA/QC, health and safety
- Development of clean-up criteria
- Field studies, e.g. surface and subsurface sampling and analysis for contaminants of concern ; may involve modification of clean-up criteria
- Preparation of a clean-up plan
- Obtain required approvals from the MOE and other government ministries
- Implementation of the clean-up plan, including disposal of all resulting wastes
- Perform confirmatory testing to ensure that clean-up criteria have been achieved
- Undertake long-term monitoring of the rehabilitated site
- Communication of results to appropriate government ministries and agencies and to the public
- Append the location and concentration of any residual contamination to the title to the property
- Submission of a final report to the MOE.



SITE DECOMMISSIONING AND RECLAMATION (Cont'd)

OWMC Services

Site decommissioning and reclamation can be very costly. There are many steps which can be taken during the lifetime of the plant to avoid problems during site decommissioning. For example :

- Use of improved technologies ("clean" process technologies, double-walled piping, leak detectors etc.)
- Implementation of the hierarchy of waste management practices and the use of periodic waste audits
- Staff education programs aimed at the prevention of unnecessary environmental contamination, and to ensure that staff are skilled in waste minimization practices
- Maintain records of: building locations and usage; the location of all unit operations; all process flowsheets and years of operation; the location of on-site waste management operations; and the location, content and quantity of all spills, clean-up undertaken and success of the clean-up.

OWMC can assist you now to avoid future problems. Alternatively, if you are planning to decommission your site soon, OWMC can provide you with lists of consulting firms skilled in the appropriate areas, e.g.

- Hydrogeological engineers to delineate the problem
- Laboratories skilled in field sampling and waste characterization
- Firms skilled in the development of clean-up criteria and clean-up plans as well as hands-on implementation of the plan
- Long-term site monitoring
- Firms which can handle the complete job, i.e. overall project management

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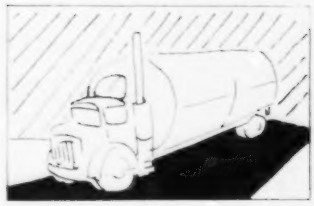
For more information contact: Janet L. Laird, Technical Services Program, OWMC, 2 Bloor Street West, Toronto, Ontario, M4W 3E2, (416) 923-2918, 1-800-268-1178, Fax 9237521.

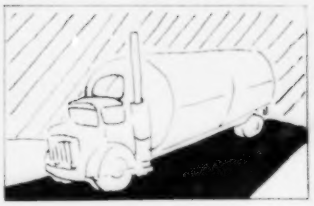


PCB WASTE MANAGEMENT

General Information

If you have PCBs on-site, either in use or in storage, there is a variety of information which may be of use to you, for example:

- According to Ontario Regulation 11/82 (Waste Management - PCB Regulation), PCB wastes include:
    - equipment containing PCBs
    - liquids containing PCBs at a concentration greater than 50 parts per million
    - materials contaminated with PCBs at a concentration greater than 50 parts per million
- If you have any of the above in storage, your site must be approved by the Ontario Ministry of the Environment as a PCB storage site
- Currently there are no technologies approved in Ontario for the disposal of high-level PCB wastes (e.g. Askarel)
- There are mobile technologies approved for use in Ontario for the disposal of low-level PCB wastes (e.g. PCB-contaminated oils).



PCB WASTE MANAGEMENT (Cont'd)

With the current high profile of PCBs in the media, many firms have questions concerning the use, storage and final disposal of PCB-contaminated materials and Askarel.

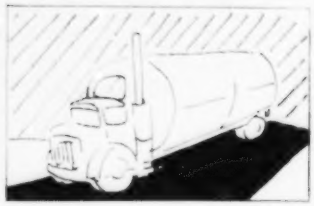
OWMC's Technical Services Program can provide you with a variety of services and information on PCBs, including:

- Government initiatives to ensure the phase-out of PCB use and in Canada
- Government-approved storage facilities
- Technologies which are capable of treating PCB-contaminated materials and those that can treat Askarel
- Which technologies are currently approved for use in Ontario
- Information on Ontario Regulation 11/82, which defines what a "PCB" waste is and controls the management of such wastes

In addition, OWMC's Laboratory Services can provide accurate analysis of materials suspected of being contaminated with PCBs, to establish if they classify as PCB wastes.

See Also : LABORATORY SERVICES PROGRAM

For more information contact : Janet L. Laird, Technical Services Program, OWMC, 2 Bloor Street West, Toronto, Ontario, M4W 3E2, (416) 923-2918, 1-800-268-1178, Fax 9237521.



SAFETY PROCEDURES FOR HANDLING HAZARDOUS WASTES

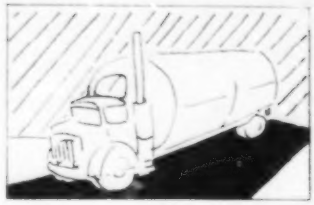
General Information

There are a number of ways in which the presence of wastes in your plant, and their handling, can present a hazard to personnel. Since the implementation of WHMIS (Workplace Hazardous Materials Information System), companies must be aware, and inform personnel, of the hazards associated with materials at their site.

However, being aware of the hazards is not always sufficient. In order to ensure workers' safety, the following must also be considered:

- Cautionary labelling of all materials indicating the hazardous nature of each one
- Ease of access to Material Safety Data Sheets (MSDS)
- Availability of the appropriate safety equipment and location chosen for easy access
- Training programs in the proper use of safety equipment
- Information on compatibility of various waste streams to prevent the hazards of inappropriate waste blending
- Storage requirements, e.g. ventilation, cold storage
- Container requirements, e.g. pressure release valves
- Shipping requirements, e.g. Transportation of Dangerous Goods Act, Regulation 309 Manifest requirements.

In order to maximize worker safety and to minimize liabilities, all of the above should be considered.



SAFETY PROCEDURES FOR HANDLING HAZARDOUS WASTES (Cont'd)

OWMC Services

OWMC's Waste Management Specialists can provide information on the following:

- Fast and accurate analysis of the waste to determine concentrations of components of concern

- Information on the hazards associated with each component of the waste, e.g. is the component:

    - flammable,
    - toxic,
    - carcinogenic,
    - mutagenic,
    - explosive,
    - pathogical,
    - corrosive,
    - reactive.

- Safe handling procedures based on the nature of the components present in the waste, e.g.

    - recommended safety equipment,
    - detailed handling recommendations,
    - compatibility with other waste streams,
    - storage requirements, and container requirement (e.g. materials of construction, pressure release valves).

- Information on the requirements for safe transportation of the waste (i.e. TDGA - Transportation of Dangerous Goods Act)

See Also : LABORATORY SERVICES PROGRAM

For more information contact: Janet L. Laird, Technical Services Program, OWMC, 2 Bloor Street West, Toronto, Ontario, M4W 3E2, (416) 923-2918, 1-800-268-1178, Fax 9237521.

LABORATORY SERVICES PROGRAM

Ontario Waste
Management Corporation

Société Ontarienne
De Gestion Des Déchets

LABORATORY SERVICES

Laboratory testing and analysis play a very important role in waste management practices. Control or optimisation of any process involving chemical reactions normally requires rapid analytical results. Modification of a process, whether for cost benefit or waste reduction, usually requires an intense program of more detailed analyses. The physical and chemical properties of the byproducts or wastes generated need to be characterized so that suitable disposal can be arranged at minimum cost.

In every case it is essential to obtain samples that adequately represent all properties of the waste. Given the variety and heterogeneity of wastes, this is often a difficult task.

OWMC personnel are widely experienced in both sampling and analysis of wastes and process streams.

After a waste has been characterized, OWMC can recommend the most suitable action your company should take. This might involve a waste audit to determine how the 4R's approach could apply to your operation. The opportunity to perform some on-site treatment may become apparent. Options for off-site treatment and final disposal can also be evaluated. The most effective treatment technology can then be determined by performing treatability testing. Technology applicability and subsequent optimization can be achieved through bench and pilot-scale testing.

Establishment of your own on-site laboratory may be the preferred choice. OWMC provides assistance with laboratory design and on-site training of your personnel to develop their skill in the areas of:

- Sampling
- Analysis
- Spot tests for monitoring
- Selection of analytical instrumentation
- Selection of equipment for sampling

In the following pages, OWMC provides information on all of the above-mentioned aspects of laboratory service, as they apply to waste management. Also included are decriptions of the laboratory services which OWMC provides to Ontario's waste generators.

WASTE CHARACTERIZATION

General Information

Characterization of a waste is an important task that needs to be done early in the scheme of waste management.

Wastes of concern include hazardous or liquid industrial waste, discharges to sewers, direct discharges to water courses, air emissions (e.g. stacks), leachates from landfill sites.

Knowledge of the chemical and physical properties of a waste is essential for selecting treatment and disposal options that comply with government regulations and are efficient, economical and environmentally friendly.

Specifically, the reasons why a waste characterization should be performed include:

- Identification of the presence or absence of hazardous qualities or constituents to establish if a waste falls under the requirements of Ontario Regulation 309
- Checking the composition of wastes at regular intervals to ensure compliance with disposal and transportation regulations
- Monitoring discharges to municipal sewers for compliance with sewer use bylaws or MISA
- Monitoring discharges to water courses for compliance with the Ontario Water Resources Act
- Determination of applicable waste reduction opportunities
- Selection of the most suitable technology for either on-site or off-site end-of-pipe treatment and disposal of the waste
- Detection of production line problems that may be compounding waste management problems
- Confirmation that waste management processes are optimized
- Adoption of safe handling practices for hazardous wastes
- Identification of incompatible wastes to avoid mixing or blending
- Identification of spot tests for on-site monitoring and for process control

WASTE CHARACTERIZATION (cont'd)

OWMC Services

The OWMC Laboratory offers a comprehensive range of services suited to the analytical needs of waste generators. OWMC is dedicated to offering fast and economical analytical results emphasizing the precision and accuracy required in waste analysis.

Recognizing the importance of providing analytical results that fulfill a proper waste characterization, the OWMC laboratory has established a program that relies on close liaison with the client. Since many wastes are complex, it is important that the analyst have direct contact with the client to ensure that likely contaminants and all likely interferences to the analytical method are identified.

To assist waste generators, OWMC offers the following services:

- Full characterization and analysis capabilities for organic and/or inorganic wastes, whether constituents are at major, minor or trace levels

- Analysis for compliance with O. Regulation 309:
  - Schedule 1 (Section 1 - wastes from non-specific sources)
  - Schedule 3 (Dioxins and Dibenzofurans)
  - Schedule 4 (Leachate Extraction Procedure)

- Analysis for compliance with O. Regulation 11/82 (PCB's)

- Analysis of discharges for compliance with municipal sewer by-laws limits

- Monitoring discharges for MISA (Municipal and Industrial Strategy for Abatement)

- Modification of analytical methods, as needed, for complex waste types to ensure that data is of high quality

- Air monitoring

See also: WASTE SAMPLING
ON-SITE TRAINING PROGRAMS
TESTING FOR ENVIRONMENTAL REGULATION

For more information contact: Joan W. Etheridge, Supervisor Laboratory Services,
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WASTE SAMPLING

General Information

A representative sample is a prerequisite for accurate characterization of waste. It is often difficult to obtain a sample that will accurately define the chemical and physical properties of a waste.

A clear definition of the goals of the sampling exercise is required before an effective sampling program can be undertaken. Examples of such goals might be to:

- Obtain enough information to establish if the waste is defined as "hazardous"
- Determine if a modification to a production process is reducing the quantity or toxicity of the waste being generated
- Check that sewer discharges are in compliance with regulations.

Regulations in Ontario require that sampling be performed for testing purposes. It is essential that the sampling plan meet the needs of the regulation. Data that are to be produced must be quantitative. This means that the levels of accuracy and precision that will be required must be decided upon before the sampling is done. Analysis of a waste that is thought to be near the regulatory threshold for a certain element will require a much greater level of accuracy and precision than one for a waste that is extremely high or low in the same contaminant. Results from previous sampling campaigns are useful in determining the statistically appropriate number of samples to take.

There are many factors that can lead to dificulties in sampling, including:

- More than one phase, e.g. slurries, emulsions
- Not homogeneous
- Access limitations due to type of containment
- Chemically unstable wastes
- Safety hazards

Equipment used in the sampling of waste is often specific to certain situations. For example, a COLIWASA (Composite Liquid Waste Sampler) is used to sample liquids and slurries contained in drums, while a THIEF SAMPLER is used primarily for powdered samples.

WASTE SAMPLING (cont'd)

OWMC Services

OWMC personnel have extensive experience in sampling hazardous wastes.

A comprehensive range of services is offered that meet both the regulatory requirements and data quality objectives required of an effective sampling program, including:

- On-site sampling of hazardous, organic, inorganic, liquid, solid and sludge type wastes by OWMC personnel
- Site-specific advice on sampling strategies that a company can employ using its own personnel
- Information on safety requirements and protective clothing for specific sampling situations

OWMC can provide reference material on:

- sampling equipment
- container type
- preservation techniques
- statistical techniques used to obtain representative samples
- suppliers

OWMC is committed to helping generators implement proper sampling techniques.

See also: WASTE CHARACTRIZATION
ON-SITE TRAINING PROGRAMS
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TESTING FOR ENVIRONMENTAL REGULATION

General Information

As concern for the environment increases, so do the number of regulations governing industrial discharges to the environment. Each generator of waste is subject to regulation. Difficulty may sometimes exist in determining which regulation applies to your scenario.

Instituting a monitoring program in agreement with the needs of the regulations is an effective way to manage and maintain the waste situation in your plant. This does not necessarily entail a large scale program of laboratory analyses at great expense. Often it is possible to use rapid on-site spot tests that can indicate whether an effluent is within regulatory guidelines.

Ascertaining which of the regulations are applicable to your waste situation can be done by answering the following questions. In every case, if the answer is affirmative it is likely that chemical analysis, and possibly physical testing, will be needed.

- Is your industrial sector affected by MISA?
  The Municipal Industrial Strategy for Abatement (MISA) program affects waste generators by industry sector. MISA is relying on generators to comply with guidelines specific to the wastes produced within their sector.

- Do you discharge liquid effluent into a sanitary sewer?
  Industry discharging effluent into a sanitary sewer must meet the bylaw of the municipality involved. Although a model by-law has been released by the Ontario Ministry of the Environment, it is at the discretion of each municipality to adjust limits to suit their own requirements.

- Do you dispose of wastes off-site?
  If so, you must establish whether or not Regulation 309 applies to them.

- Do you have airborne emissions?
  The generation of airborne emissions is governed by Regulation 308.

TESTING FOR ENVIRONMENTAL REGULATION (cont'd)

OWMC Services

OWMC offers a wide range of analytical services capable of handling all of industry's regulatory needs. These include;

- Leachate Extraction Procedure for compliance with O. Regulation 309, Schedule 4
- Dioxin and Dibenzofuran analysis under O. Regulation 309, Schedule 3
- Analysis for municipal sewer by-law compliance
- PCB analysis for compliance with O. Regulation 11/82
- Municipal and Industrial Strategy for Abatement monitoring (MISA)
- Air monitoring under O. Regulation 308

A fee schedule for these services is available upon request.

See also: WASTE CHARACTERIZATION
WASTE SAMPLING

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TREATABILITY TESTING

General Information

Many wastes generated in Ontario are unsuitable for destruction by incineration. Generally these are wastes containing either inorganic constituents only or mixtures of inorganics and organics, such as emulsions.

Treatability testing using bench-scale methods assists in the selection of the most appropriate treatment technology for a waste. The goal of treatability testing is to determine the technology that will yield the highest quality (i.e. least contaminated) effluent.

Examples of treatment technologies are:

- Chemical destruction of dangerous ions, such as cyanide
- Separation of oils and/or insoluble organics from emulsions
- Separation of heavy metals from water by converting them to a very insoluble form, by chemical reactions, and precipitating them out of solution.

It is essential that the chemical and physical properties of the waste be characterized prior to undertaking treatability testing. Results of the analysis identify applicable treatment options.

The determination of the best available treatment technology for the waste can then be chosen by undertaking comprehensive bench-scale testing, optimizing all parameters involved in the treatment. Pilot-scale testing can be performed if concerns exist regarding scale-up. This results in the most cost-effective and efficient waste management process and permits cost estimates of full-scale treatment.

In many circumstances, more than one technology may be necessary for effective treatment. In this situation, sequential treatability testing is required to determine the order in which the treatment technologies should be applied to the waste.

TREATABILITY TESTING (cont'd)

OWMC Services

The OWMC Laboratory offers comprehensive bench-scale and pilot-scale testing of the application of treatments to wastes, backed by full state-of-the-art analytical capabilities.

To assist waste generators, the OWMC offers the following treatment technologies:

- Chemical Oxidation/Reduction: The potential environmental damage caused by a waste can be lessened by transforming undesirable chemical constituents to another species, e.g. reduction of Cr^{+6} to the lower oxidation state Cr^{+3}, which is less toxic. Cyanide destruction falls under this category also.

- Neutralization: Wastes containing acidic or alkaline substances must be neutralized prior to discharge or subsequent treatment. Adjustment of the pH is made to meet regulatory and treatment requirements and to precipitate metals present in the waste.

- Coagulation/Precipitation: Chemical addition to wastes containing a metal/colloidal dispersion results either in the formation of flocculant suspensions in which the desired pollutants will be trapped or of insoluble precipitates of the pollutants themselves.

- Ultrafiltration and Reverse Osmosis: These are similar technologies to filtration but capable of removing much finer materials. UF removes large organic molecules and particulate matter from a wastewater while RO removes ions (charged particles).

- Carbon Adsorption: This is employed in the removal of low concentrations of organic contaminants from wastewaters.

- Biological Treatment: Bacteria are used to convert organic materials to less harmful forms. It is also used to break down nitrates, which, although they are often applied to farmland as fertilizers, can cause eutrophication of lakes if present in unsuitable concentrations in wastewater being discharged directly to a water course.

See also: WASTE CHARACTERIZATION
WASTE SAMPLING

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ON-SITE TRAINING PROGRAMS

General Information

On-site training improves the ability of your staff to provide you with meaningful data rapidly. This training is finely focussed to address sampling and analysis skills needed at the location where they will be used and on the actual wastes generated at that site.

Regulatory demands for increased information on wastes require that analytical campaigns or programs be undertaken. The sampling of waste is often difficult, requiring education, skills and strategies to obtain a representative sample. The wide range of equipment and techniques available makes proper training in this area essential.

Some generators already have on-site laboratories. The expansion of currently existing capabilities may be needed for those generators wishing to test and analyse their wastes themselves.

Those generators considering the development of on-site laboratory facilities can benefit from consultation with experienced analytical chemists.

In either case, an on-site training program can establish the necessary protocols, procedures and equipment to meet regulatory requirements. A well trained staff will be able to respond effectively to discrepancies in the analytical results and resolve waste management problems faster.

Education in the safety requirements for the handling of hazardous wastes is now mandatory for workers in contact with such wastes. On-site training can provide education in all aspects of safety to minimize risk in the working environment and comply with WHMIS regulations.

ON-SITE TRAINING PROGRAMS (cont'd)

OWMC Services

OWMC's personnel can assist industry with on-site training in many areas of sampling and analysis related to waste management. Educating workers at their own workplace, with training suited to the waste generator's specific situation, is the best approach.

The OWMC Laboratory offers training in the sampling and analysis aspects of waste management and is committed to helping generators resolve their waste problems specifically in the areas of:

- Laboratory services development including:
    - testing required for regulations
    - suitable analytical methods
    - analytical instrumentation
    - rapid spot tests

- On-site sampling including:
    - sampling strategies
    - statistical techniques used to obtain a representative sample
    - use of sampling equipment.
    - appropriate sample containers
    - preservation techniques

- Safety training in the handling of hazardous wastes

See also: WASTE CHARACTERIZATION
WASTE SAMPLING
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LABORATORY DESIGN

General Information

Demands for analysis of wastes continue to increase as regulations become more stringent. One way to handle these demands is to perform more of the required analyses on-site instead of sending samples to an external contract laboratory.

Generators currently possessing on-site laboratories for their product control and/or certification already have facilities from which to monitor their wastes. Implementation of a waste monitoring program requires that the appropriate tests be identified and the necessary equipment selected.

Companies that do not have an on-site laboratory at present may wish to set one up. External assistance can be useful to establish what needs to be monitored, where and with what frequency. Laboratory requirements for space, personnel and equipment are based on these needs.

Reasons for considering an on-site laboratory include:

- Confidentiality of information
- Costs for off-site analytical work
- Rapid turnaround time of analytical results
- Ease of confirming that effluents and emissions comply with regulations
- Likelihood of municipalities transferring responsibility to industries for monitoring their sewer discharges
- Increased monitoring requirements for MISA

LABORATORY DESIGN (cont'd)

OWMC Services

The development or expansion of on-site laboratory facilities, on either a large or small scale, requires careful planning. Ensuring the proper testing and apparatus requirements are available involves close consultation with an analytical chemist.

OWMC'S experience in the area of laboratory design and management can assist you in the following ways.

- Selection of essential routine tests to meet your specific needs
- Validation of spot tests on your wastes
- Identification of intermittent but necessary testing that should be performed by a contract laboratory.
- Linear bench space and total floor area estimates
- Effective layout to facilitate equipment maintenance and worker safety
- Manpower estimates based on type and quantity of workload
- Fumehood selection and location in the lab
- Air handling requirements (HVAC) and energy conservation

See also: WASTE CHARACTERIZATION
ON-SITE TRAINING PROGRAMS
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